ONTARIO MINISTRY OF ENVIRONMENT
36936000023036

ANNUAL REPORT 1964

CONISTON

water pollution control plant

LIBRARY COPY
NOV 25 1965
O[illegible] WATER
RESOURCES COMMISSION

DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

TD
367
.A56
C665
1964
MOE

TD Coniston water pollution control
367 plant : annual report 1964.
.A56 82256
C665
1964

ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

Members of the Coniston Local Advisory Committee,
Town of Coniston.

Gentlemen:

We are pleased to provide you with the 1964 Operating Report for the Coniston Water Pollution Control Plant, OWRC Project No. 57-S-8.

By continuing the mutual cooperation which has existed in the past, we can look forward to greater progress in the field of water pollution control.

Yours very truly,

D S Caverly

D. S. Caverly,
General Manager

Environment Ontario
[illegible]
Canada

TD
227
C66
W38
1960
NME

A517

General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Coniston Water Pollution Control Plant, OWRC Project No. 57-S-8 for 1964.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B C Palmer

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

Digitized by the Internet Archive
in 2015

https://archive.org/details/conistonwaterpol23036

FOREWORD

This report describes the operation of this project for the year 1964. It includes a detailed description of the project, summary of operation, graphs and charts showing quality and quantity information, and project cost data.

This information will be of value to the municipality in assessing the adequacy of the works in meeting existing requirements and in projecting its capability to meet future expected demands. The cost information will be of particular interest to those concerned with developing and maintaining revenue structures.

The preparation of this report has been a cooperative effort of several groups within the Division of Plant Operations. These include the Statistical Section, Brochures Officer and the Regional Supervisor. However, the primary responsibility for the content has been with the Regional Operations Engineer. He will be pleased to discuss all aspects of this report with the municipality.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

CONTENTS

Foreward 1
Title Page 3
'64 Review 4
Glossary 5
History 6
Project Staff 7
Description of Project 8
Plant Flow Chart 9
Project Costs 10
Design Data 13
Process Data 14

CONISTON
water pollution control plant
operated for

THE TOWN OF CONISTON

by the

ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN: Dr. James A. Vance

VICE-CHAIRMAN: J. H. H. Root, M.P.P.

COMMISSIONERS

W. D. Conklin, Q.C.	**D. Aubrey Moodie**
Louis R. Desmarais	**H. E. Brown**

GENERAL MANAGER: D. S. Caverly

ASSISTANT GENERAL MANAGERS	COMMISSION SECRETARY
G. M. Galimbert L. E. Owers	W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director:	**C. W. Perry**
Regional Supervisor:	**D. A. McTavish**
Operations Engineer:	**M. B. Fielding**

801 Bay Street Toronto 5

'64 REVIEW

The installation of a flow meter in July, 1964 has proved beneficial in evaluating the efficiency of the Coniston Water Pollution Control Plant.

On the basis of five months data, the flow of sewage to the plant averaged 175,000 gallons per day as compared to the design flow of 150,000 gallons per day for secondary treatment.

The plant efficiency for the year was less that that expected for the activated sludge process, being 87.5% and 79.0% in BOD and suspended solids respectively. This efficiency reflects the slight hydraulic overload experienced by the plant.

The strength of the influent sewage during 1964 was consistent with average domestic sewage, having an average BOD of 229 ppm and an average suspended solids content of 226 ppm. The plant efficiency for the year was consistent with design expectations for the activated sludge sewage treatment process, giving reductions of 87.5% and 79.0% in BOD and suspended solids respectively.

The cost of operating during 1964 was $11,738.97 representing a per capita cost of $4.50 or a cost of approximately $178.28 per million gallons of sewage treated.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY

1957 – 1964

INCEPTION

In June, 1957, the Ontario Water Resources Commission entered into an agreement with the Town of Coniston for the construction of a water pollution control system. The system, designed by E. M. Powell and Associates, Consulting Engineers, Sudbury, Ontario, consisted of five sewage pumping stations, sanitary sewers and an activated sludge water pollution control plant.

APPROVAL

In February, 1958, the municipality signed an agreement with the Ontario Water Resources Commission to finance, construct and operate a water pollution control system.

CONSTRUCTION

Under the supervision of the Consulting Engineers, Carrington Construction Company Limited completed the project. On December 5, 1958, the plant was put into temporary operation, and came into full operation on April 30, 1959.

TOTAL COST

$472,784.

K. GLIBBERY
CHIEF OPERATOR

Project Staff

COMMENTS

Mr. Glibbery's duties include operation and maintenance of the water pollution control plant, along with twice daily inspections of the pumping stations. The plant is normally under 40 hours of supervision a week, or seven hours a day five days a week with two-and-a-half hours of supervision on both Saturday and Sunday.

Description of Project

COLLECTION SYSTEM

The sewage of the municipality is collected by a system of sanitary sewers, ejector stations and finally an underground lift station which pumps the sewage to the influent works of the plant, from which it flows through the plant by gravity.

The sewers are maintained by the Town's Works Department, coupled with periodic manhole inspections by the plant operator.

LIFT STATIONS

All of the lift stations are automatically controlled, cutting on and off as the level in the wet well rises and falls.

Lift station No. 1, located at the northeast corner of Mitchell and William Streets, consists of an underground wet well and dry well with one 60 gallons per minute capacity pneumatic ejector.

Lift stations Nos. 2, 3 and 4, located at the soutwest corner of Nickel and William Streets, the southwest corner of Horace Avenue and Caruso Street, and the southwest corner of Concession Street and Forth Avenue, respectively, are similar to Station No. 1, except that two 60 gpm pneumatic ejectors are included instead of one.

Station No. 5, located just east of the plant, consists of dry and wet wells with two vertical drive centrifugal pumps which handle all incoming sewage.

SCREENING

A screening chamber in the influent works removes floating rags, papers and other large solids, together with inorganic solids such as sand. The screening chamber is flushed out periodically to the sludge drying beds.

PRIMARY TREATMENT

The primary settling tank is 24 feet in diameter, with a volume of 18,400 gallons. The raw sludge, made up of organic settleable solids, is drawn off to the primary digester.

The volume of the aeration tank is 55,800 gallons. The tank is equipped with a six foot diameter high-intensity aerating cone driven by a self-contained motor and drive unit.

Final settling is provided in a 28 feet diameter, settling tank having a volume of 25,000 gallons which is equivalent to 3.2 hours retention at 125% of dry weather flow.

Activated sludge is returned to the aeration section by means of a three inch horizontal spindle pump.

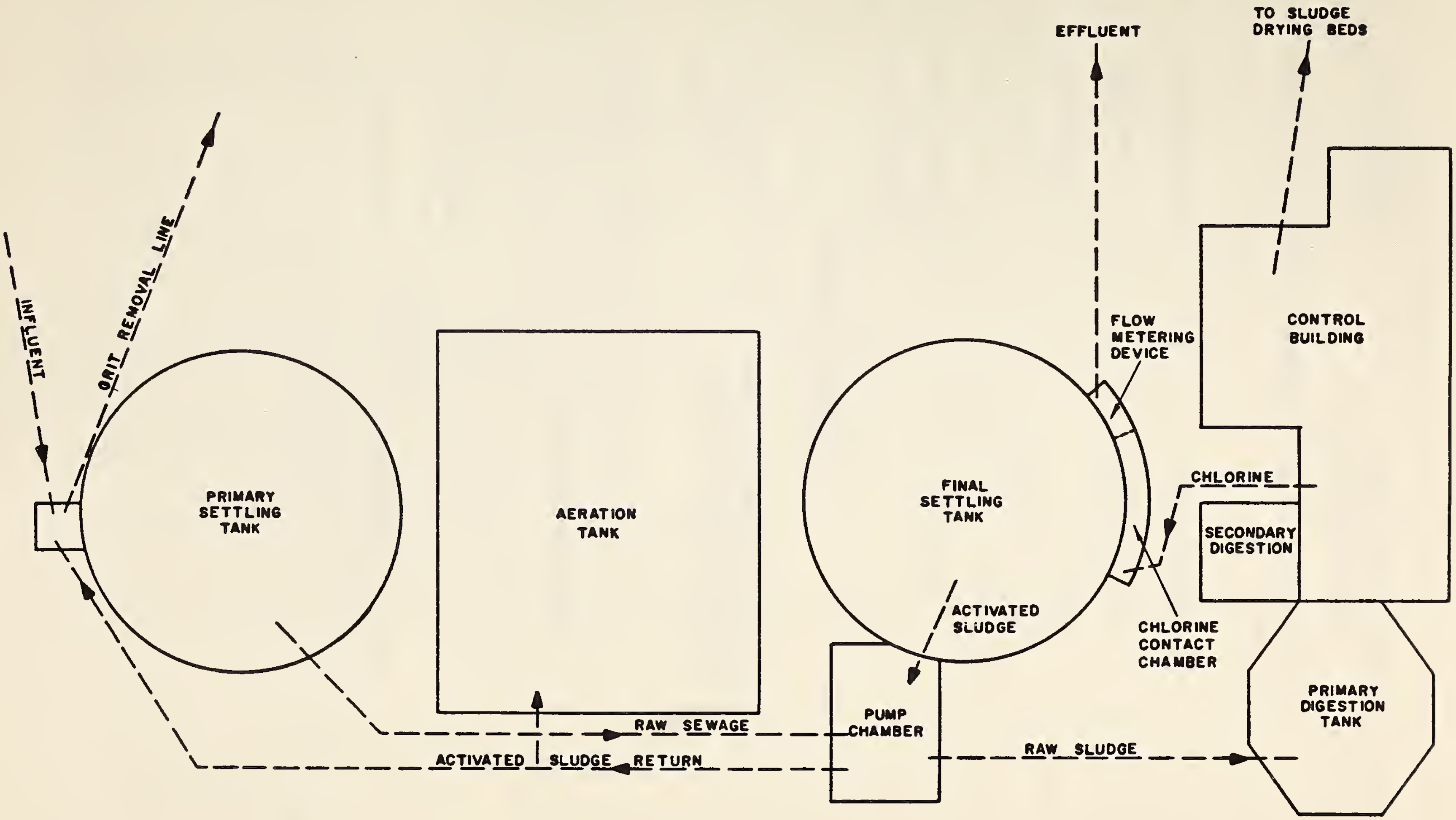
DIGESTION

The plant is equipped with two-stage digestion having a combined capacity of 7170 cubic feet.

Sludge is drawn off from the secondary digester and run to the sludge drying beds. There are six drying beds, 20 feet by 30 feet, giving a surface area of 3600 square feet or a design rating of 1.39 square feet per capita. The drying beds are underdrained with the filtrate running to the wet well of the No. 5 lift station. The beds are manually cleaned and the dried sludge used as soil conditioner by the local residents and in the town's land reclamation program.

Effluent is chlorinated during the summer months as required by the Sanitary Engineering Division of the OWRC. Coniston Creek is the receiving stream.

FLOW CHART


EFFLUENT
TO SLUDGE DRYING BEDS
INFLUENT
GRIT REMOVAL LINE
FLOW METERING DEVICE
CONTROL BUILDING
CHLORINE
PRIMARY SETTLING TANK
AERATION TANK
FINAL SETTLING TANK
SECONDARY DIGESTION
ACTIVATED SLUDGE
CHLORINE CONTACT CHAMBER
PRIMARY DIGESTION TANK
PUMP CHAMBER
RAW SEWAGE
ACTIVATED SLUDGE RETURN
RAW SLUDGE

PROJECT COSTS

LONG TERM DEBT: (Total Capital Cost)	$468,190.00

The total cost to the municipality during 1964 was as follows:

Net Operating	$ 11,738.97
Debt Retirement	9,448.00
Reserve	3,648.00
Interest Charged	26,340.55
TOTAL	$ 51,175.52

RESERVE ACCOUNT

Balance at January 1, 1964	$ 9,698.90
Deposited by municipality	3,648.00
Interest Earned	449.31
	$ 13,796.21
Less Expenditures	7,510.00
Balance at December 1, 1964	$ 6,286.21

DEBT OUTSTANDING:	$414,230.95

YEARLY COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY
JAN	608.41	340.82		35.57	102.81		38.95	21.19		69.07
FEB	729.67	340.82	28.14	89.68	77.37		4.00		123.23	66.43
MARCH	810.06	387.94	78.84	57.87	114.63		28.67	3.77	44.20	94.14
APRIL	1262.35	403.70		78.96	102.99	574.03	20.02		10.50	72.15
MAY	1130.99	571.63	56.72	168.12	109.41				141.26	83.85
JUNE	2161.18	398.77		45.73	72.04	(108.84)	73.29	1545.00	72.13	63.26
JULY	829.71	357.06	269.60	48.40	67.91	(140.00)	4.00		130.14	92.60
AUG	1303.69	357.06	357.26	27.68	61.17	349.05	44.99		27.51	78.97
SEPT	601.44	357.06	198.66		61.53	(175.00)			44.83	114.36
OCT	707.58	357.06	32.62	42.62	60.23		44.57		93.59	76.89
NOV	611.50	357.06	49.66		92.91		5.00		47.25	59.62
DEC	982.39	544.07		134.68	191.89	(175.00)	106.26		13.53	166.96
TOTAL	11738.97	4773.05	1071.50	729.31	1114.89	324.24	369.55	1569.96	748.17	1038.30

BRACKETS INDICATE CREDIT

MONTHLY COSTS

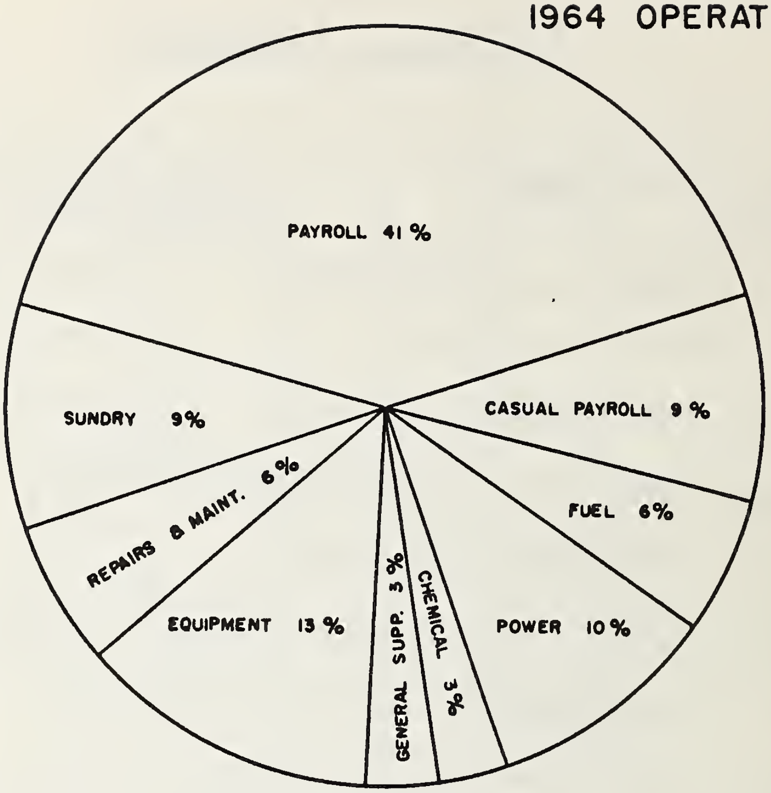
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1962	** 40.150	10345.20	15.56	257.66	12 CENTS
1963	** 54.750	8669.18	13.03	158.34	8 CENTS
1964	* 65.844	11738.97	17.55	178.28	9 CENTS

+ BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

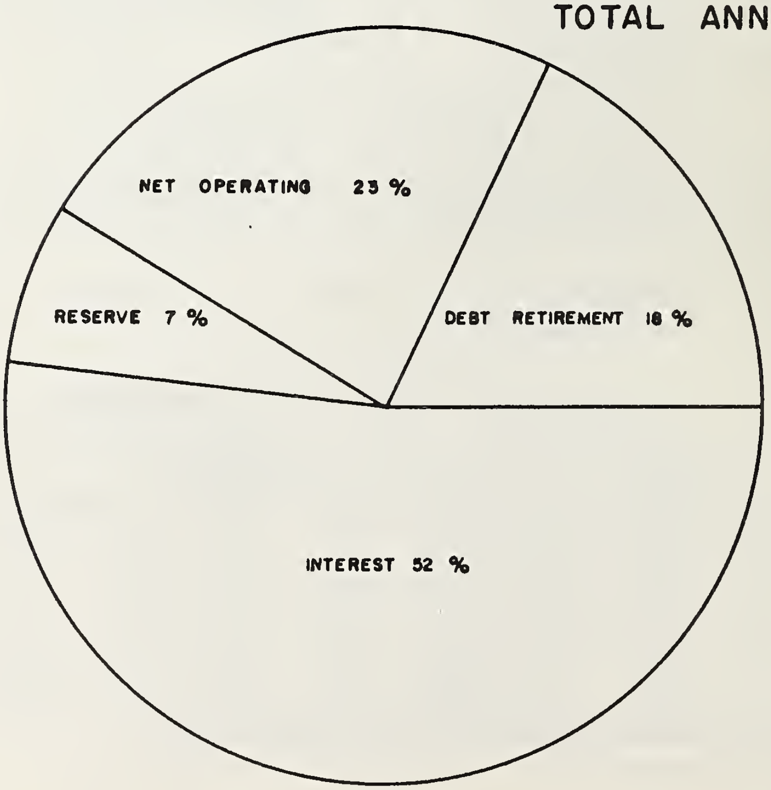
* PRO-RATED ON AVAILABLE DATA

** ESTIMATED

1964 OPERATING COSTS



TOTAL ANNUAL COST



Technical Section

Design–Data

GENERAL

Type of Plant - Activated sludge; mechanical aeration.

Design Population - 2,500 persons.

Design Plant Flow - 260,000 gpd for primary treatment 150,000 gpd for complete treatment.

Per Capita Flow - 60 gpd.

Five Day BOD -

Raw Sewage - 200 ppm

Removal - 93%

Suspended Solids -

Raw Sewage - 250 ppm

Removal - 93%

PRIMARY TREATMENT

A chamber in the influent works fitted with a screen serves as both a grit removal and screening facility.

PRIMARY SEDIMENTATION TANK

1 - 24 ft. diameter unit
Volume - 18,400 gallons
Retention Time - 2.94 hours
Surface Settling - 332 gallons per sq. ft. per day.
Weir Overflow - 1700 gallons per linear ft. per day.

SECONDARY TREATMENT

Aeration Section

1 - 29 ft. x 29 ft. tank with 6 ft. diameter Ames-Crosta-Mills cone.

Volume - 55,800 gallons

Retention Time - 7.15 hours assuming 25% return sludge.

FINAL SEDIMENTATION

1 - 28 ft. diameter type "F" tank (Ames-Crosta-Mills).

Volume - 25,000 gallons

Retention Time - 3.2 hours @ 125% of dry weather flow.

Surface Settling - 572 gallons per square foot per day.

Weir Overflow - 720 gallons per foot per day.

DIGESTION SYSTEM

Two stage having a combined capacity of 7170 cu. ft.
Loading 2.74 cu. ft. per capita.

Primary Digestion Tank

1 - concrete structure 19 ft. 3 in. across flats.
Octagonal in shape with a 12 in. diameter screw pump and 10 HP motor.

Secondary Digestion Tank

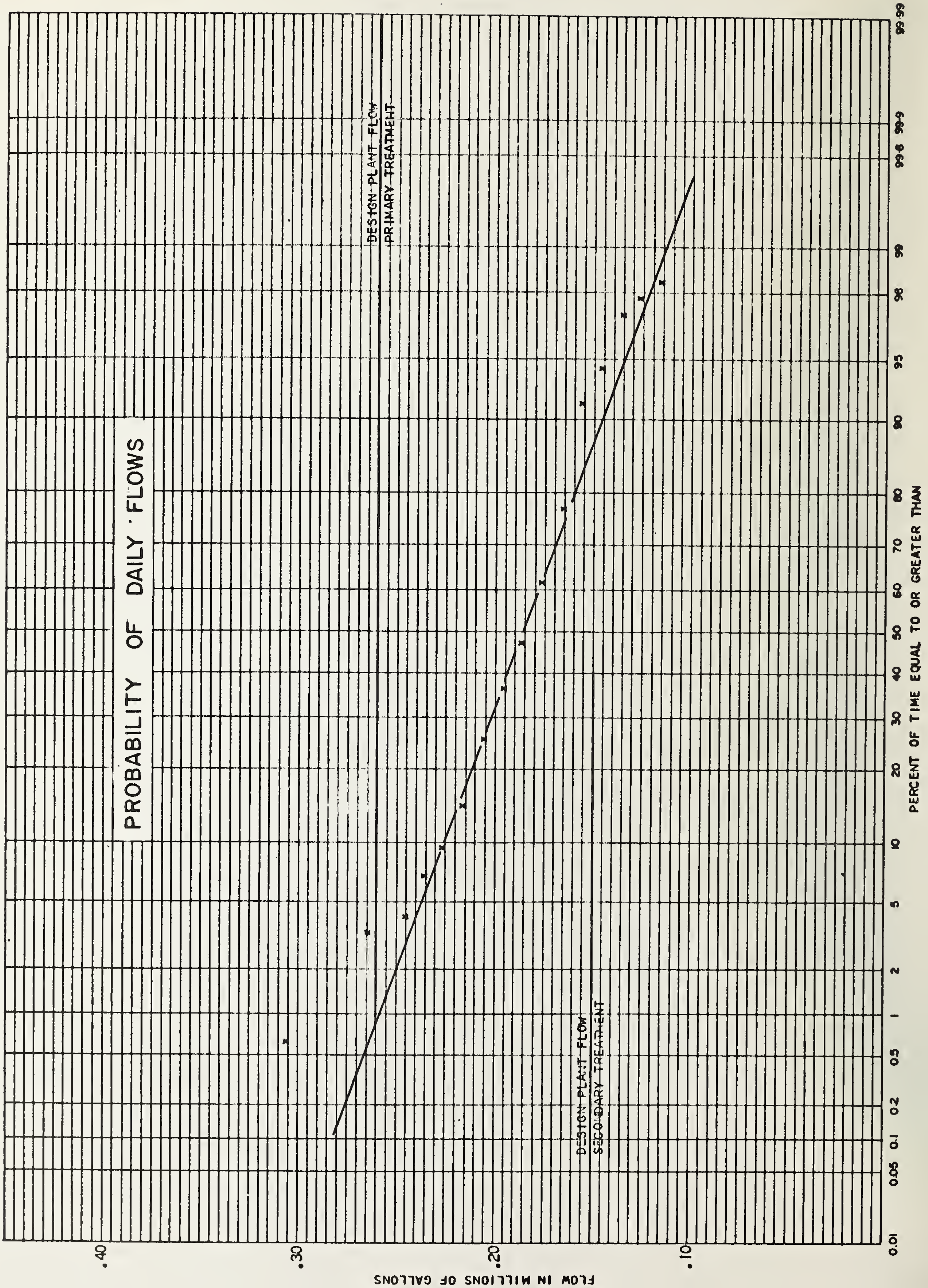
1 - concrete structure 10 ft. x 10 ft. x 8 ft. deep - 2 inch plank roof.

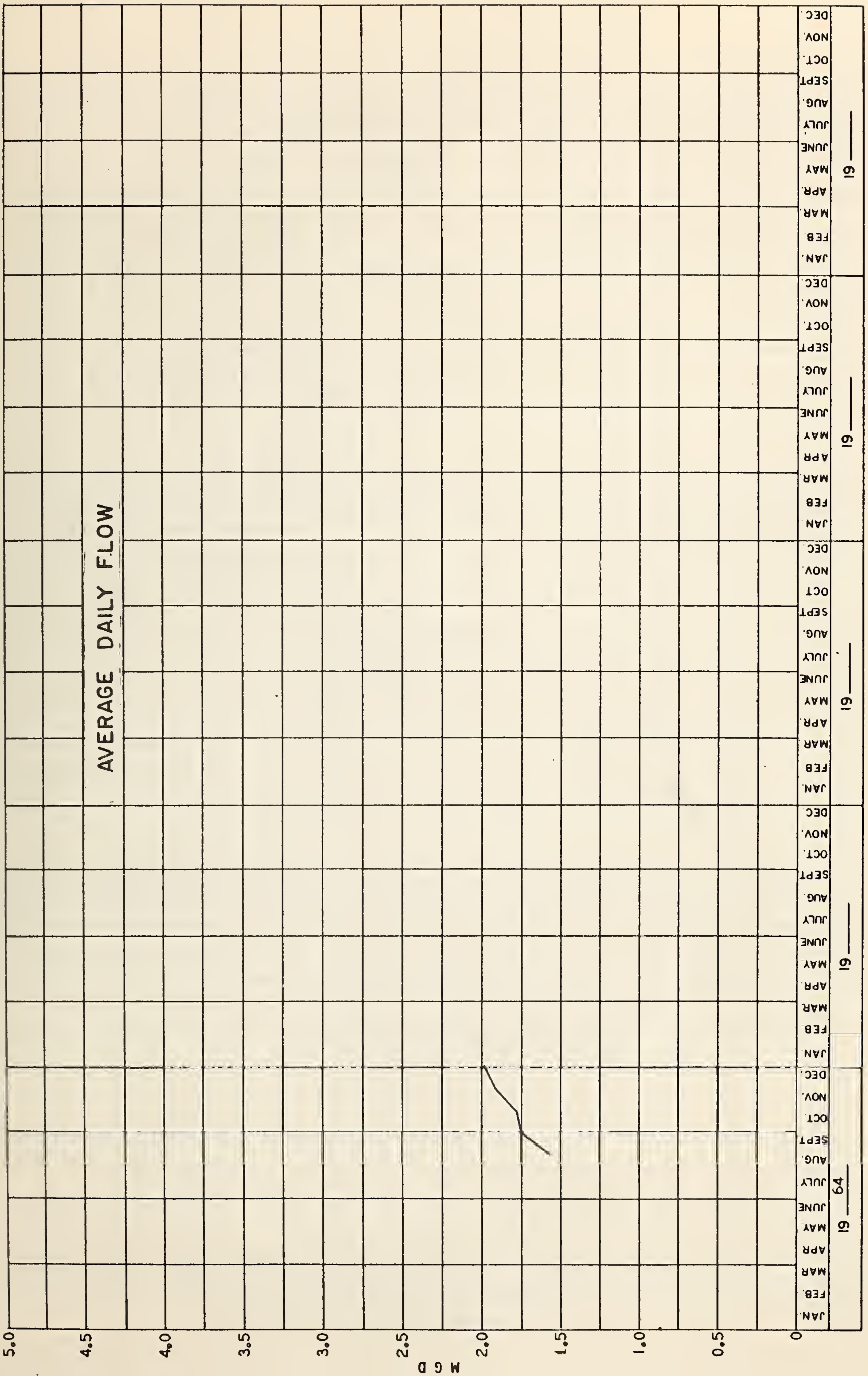
SLUDGE DRYING BEDS

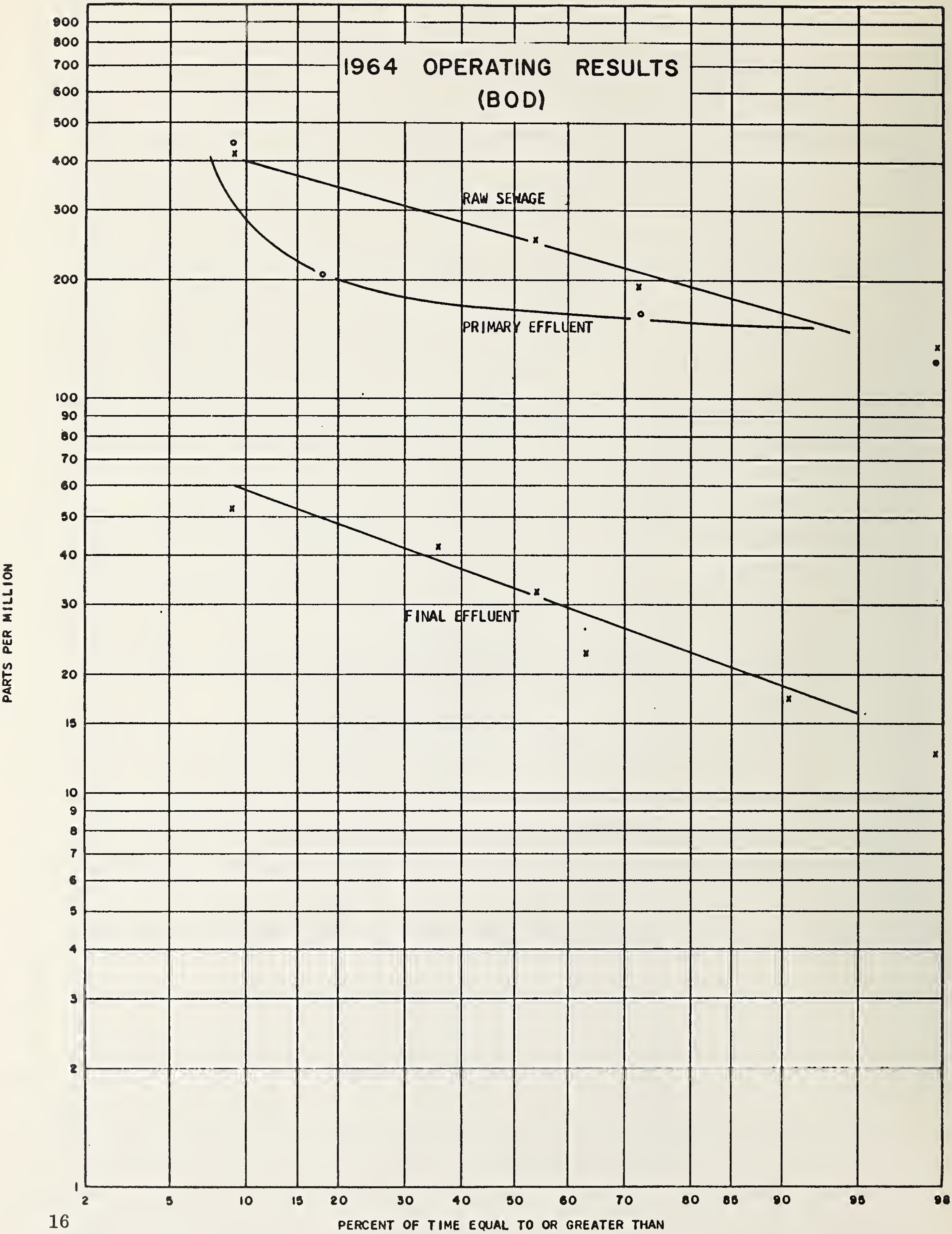
6 beds each 20 ft. x 31 ft.

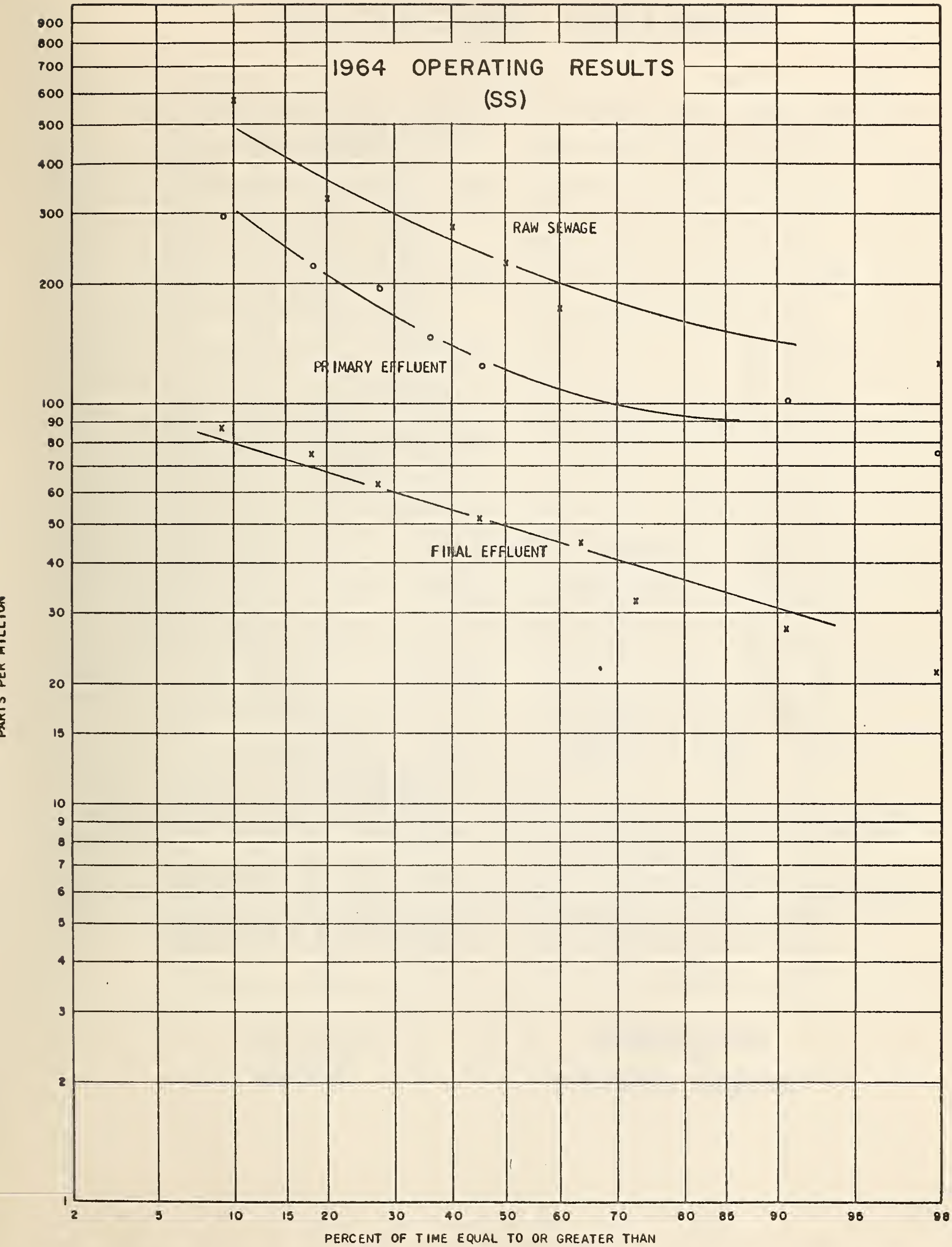
CHLORINATION

Contact chamber providing 10 minutes detention.
Chlorinator: Wallace and Tiernan - Type A 678.

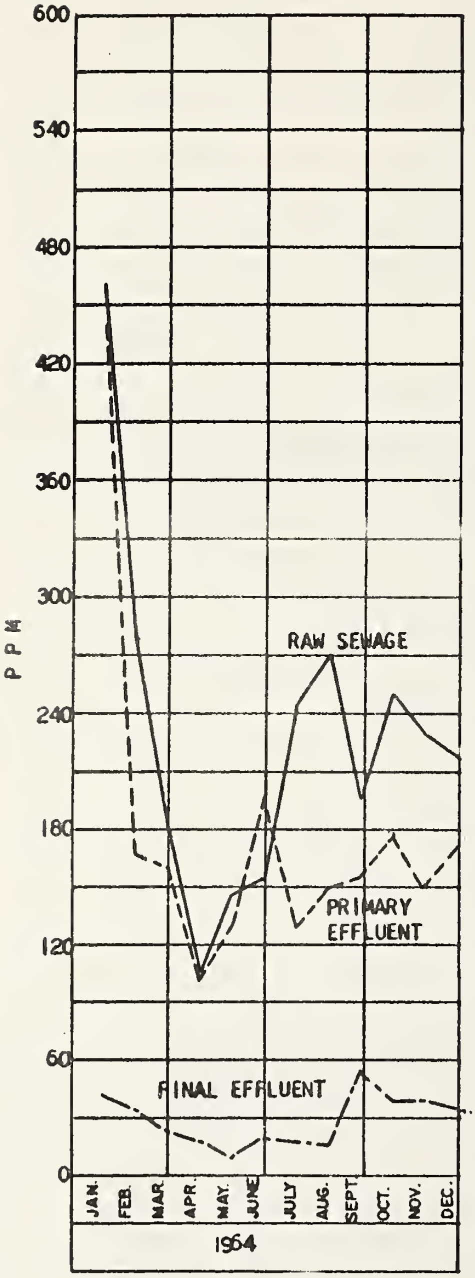

PROBABILITY OF DAILY FLOWS
DESIGN PLANT FLOW
PRIMARY TREATMENT
DESIGN PLANT FLOW
SECONDARY TREATMENT
PERCENT OF TIME EQUAL TO OR GREATER THAN
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
FLOW IN MILLIONS OF GALLONS
.40
.30
.20
.10


AVERAGE DAILY FLOW
M G D
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
19 64
19
19
19
19

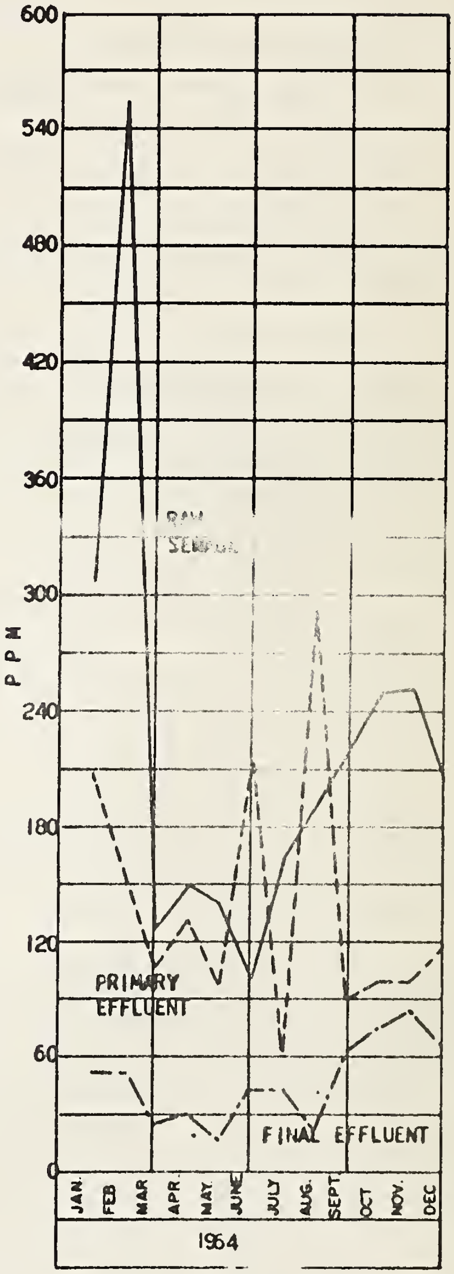

1964 OPERATING RESULTS
(BOD)
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
PARTS PER MILLION
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
PERCENT OF TIME EQUAL TO OR GREATER THAN


1964 OPERATING RESULTS
(SS)
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
PARTS PER MILLION
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
PERCENT OF TIME EQUAL TO OR GREATER THAN

MONTHLY VARIATIONS



Biochemical Oxygen Demand



Suspended Solids

GRIT, B.O.D AND S.S. REMOVAL

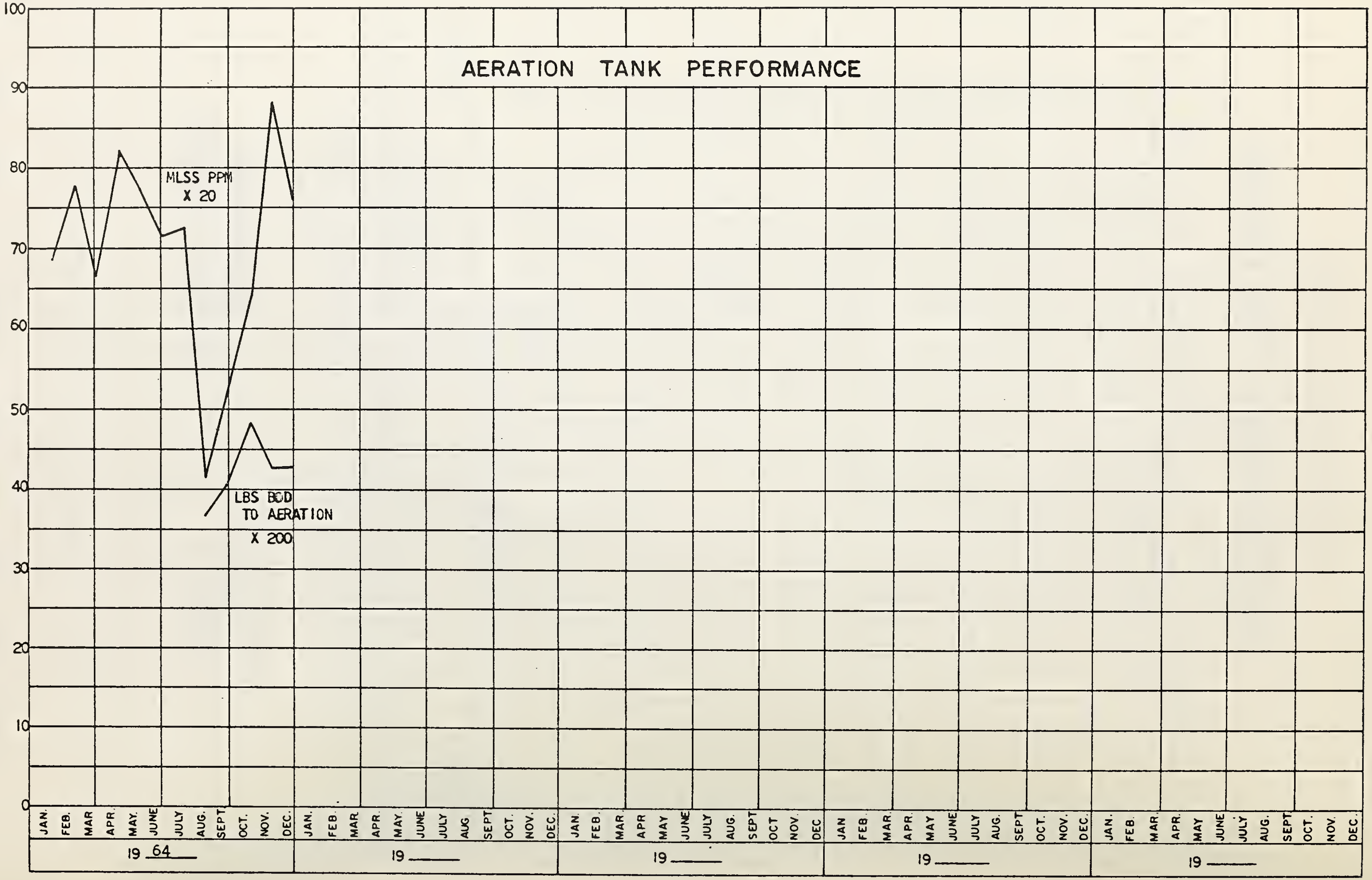
MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	460	41	91.0	11.7	306	52	83.0	7.1	30
FEB.	280	34	88.0	6.4	552	52	90.5	13.0	60
MAR.	180	23	87.0	4.4	126	26	79.5	2.8	60
APR.	106	18	83.0	2.4	148	31	79.0	3.2	45
MAY	145	10	93.0	3.8	140	18	87.0	3.4	30
JUNE	155	19	87.5	3.7	102	44	57.0	1.6	30
JULY	195	18	90.5	4.9	164	44	73.0	3.4	30
AUG.	250	17	93.0	5.6	*	24	*	-	30
SEPT.	245	54	78.0	5.0	218	63	71.0	4.1	15
OCT.	270	40	85.0	6.3	250	76	70.0	4.8	45
NOV.	230	40	82.5	5.4	252	84	66.5	4.8	30
DEC.	**229	29	87.5	6.1	**226	47	79.0	5.5	45
TOTAL				65.8				58.9	450
AVG.	229	29	87.5	5.5	226	47	79.0	4.9	38

* sample exhausted - no further determinations possible

** average values substituted - January to July loadings determined with average flow of .180 mgd.

COMMENTS

The efficiency of the plant when measured by the BOD and suspended solids reductions of 87.5% and 79.0% respectively. The average daily flow was 180,000 gallons which is above the plant design flow of 150,000 gallons.



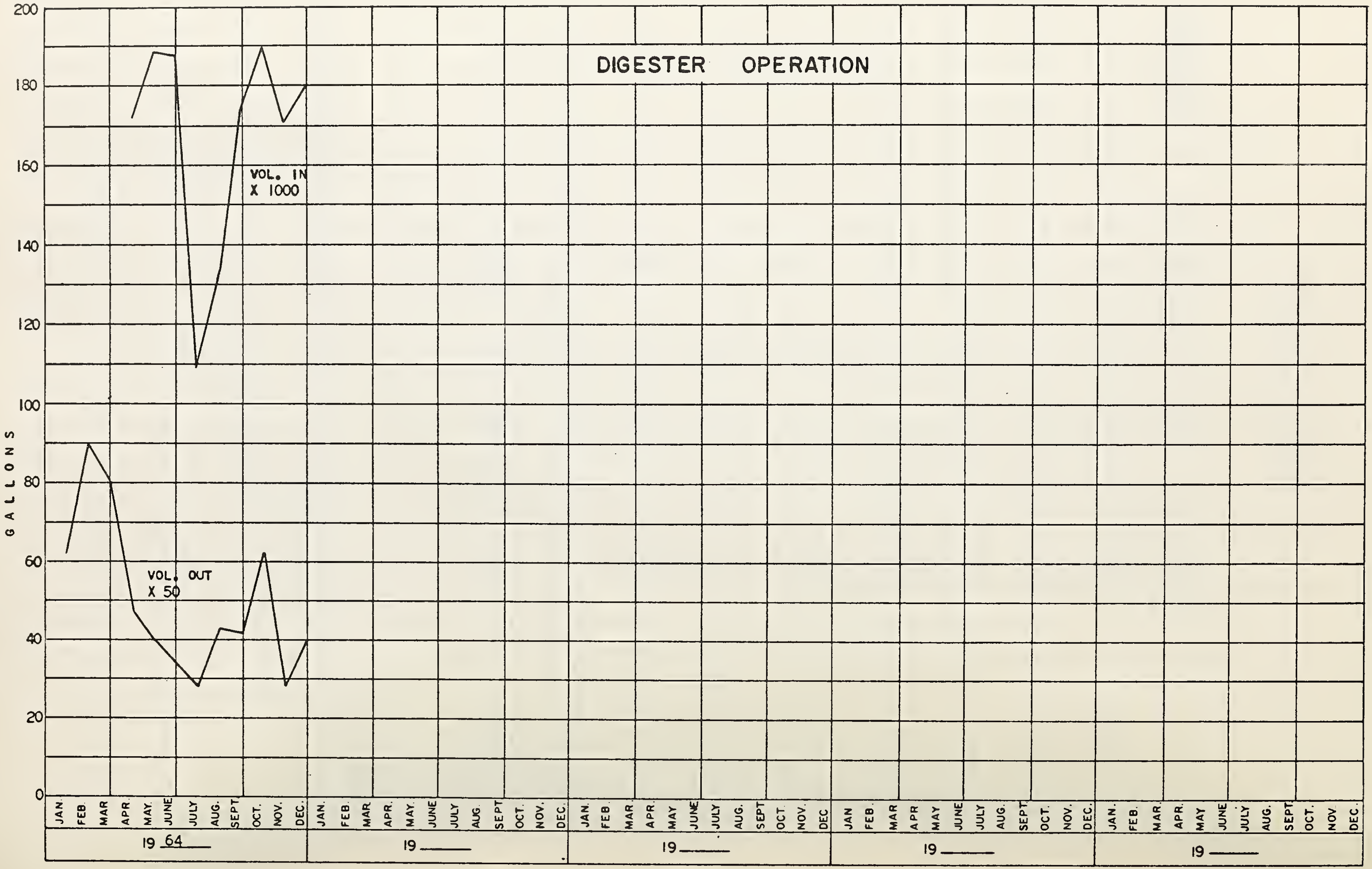
AERATION TANK PERFORMANCE

AERATION SECTION

MONTH	PRIM. EFFL B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. B.O.D. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	440	1369		
FEBRUARY	165	1550		
MARCH	160	1328		
APRIL	105	1646		
MAY	130	1544		
JUNE	195	1434		
JULY	130	1447		
AUGUST	150	823	52	
SEPTEMBER	155	1060	47	
OCTOBER	175	1272	39	
NOVEMBER	150	1762	34	
DECEMBER		1514		
TOTAL				
AVERAGE	178	1396	113	

COMMENTS

An absence of proper sampling in the first part of 1964makesa proper evaluation of the aeration section impossible.


DIGESTER OPERATION
GALLONS
200
180
160
140
120
100
80
60
40
20
0
VOL. IN
X 1000
VOL. OUT
X 50
JAN.
FEB.
MAR
APR.
MAY.
JUNE
JULY
AUG.
SEPT
OCT.
NOV.
DEC.
19 64
19
19
19
19

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	1000'S CU.FT.	% SOLIDS	% VOL. MAT.	1000'S CU.FT.	% SOLIDS	% VOL. MAT	
JAN.		3.67		0.50	2.78		
FEB.		1.72		0.72			
MAR.		2.19		0.64	2.25		
APR.	* 27.59	4.51		2.08			
MAY	30.29	7.00		1.75	6.45		
JUNE	30.16			2.02			
JULY	17.47	4.06		0.22	6.54		
AUG.	21.36	1.84		0.34	5.23		
SEPT.	27.88	6.65		0.34	6.03		
OCT.	30.45	5.82		0.50	7.60		
NOV.	27.40	5.25		0.22	8.91		
DEC.	28.85			0.32			
TOTAL	+321.53			9.65			
AVG.	26.83	4.27		.80	5.72		

* commenced reporting this item
+ total prorated on nine months

COMMENTS

A total of 321,530 cubic feet of sludge was pumped while only 9,650 cubic feet of sludge was pumped to the sludge beds. This indicates that there was good solids separation and that the resultant supernatant was returned to the plant for further treatment.

TD
367
.A56
C665
1964

Coniston water pollution control plant : annual report 1964.

82256

Environment Ontario

ONTARIO WATER RESOURCES COMMISSION